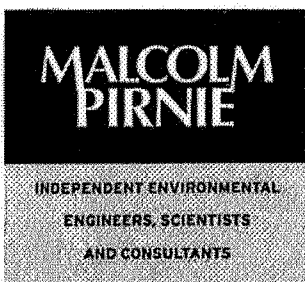


**EXHIBIT H**



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## MEMORANDUM

TO: Venetia Barnes (NYCDEP)

FROM: Donald Cohen and Julie Kim

DATE: July 19, 2007

RE: Station 6 Demonstration Plant  
Contaminant Transport Modeling

### 1.0 Purpose

Authorized under contract EE-DSGN2, Malcolm Pirnie characterized the projected concentration trends at Station 6<sup>1</sup> using a groundwater flow and solute transport model for the following contaminants:

- Methyl tertiary-butyl ether (MTBE)
- Naphthalene.

These efforts are part of the work to finalize the volatile organic compound (VOC) removal process prior to resuming work on the Station 6 treatment plant design. This memorandum reviews the groundwater modeling assumptions and results for MTBE and naphthalene. The findings of this memorandum, together with the *MTBE Desktop Evaluation Memorandum* and *MTBE Technology Update Memorandum*, will be used to conduct subsequent analyses towards finalizing the VOC removal process.

### 2.0 Introduction

Based on the results of previous studies, Malcolm Pirnie identified two sources of MTBE potentially impacting Station 6, namely Citgo Service Station and Atlas Service Station. These studies are summarized in the *MTBE Desktop Evaluation Memorandum*. Limited available spill data at these sites, historical pumping information at Station 6, and reasonable assumptions about the nature and extent of the contamination were incorporated into a groundwater flow and solute transport model used to delineate the MTBE plumes at Citgo and Atlas and evaluate their potential impact at Station 6.

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<sup>1</sup> Station 6 includes wells 6, 6A, 6B, 6C, 6D, and 33

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### **Worst Case Scenario**

The worst case scenario assumes that there is no cleanup at the contamination sources. Therefore, the modeled MTBE plumes shown in Figure 3 are the initial conditions for this scenario. Figure 5 shows some of the results from the solute transport model. These snapshots illustrate the migration over time of the MTBE contamination from the service stations to Station 6. The results indicate that pumping Station 24 (prior to activating Station 6) has minor effects on the MTBE plume migration. However, once Station 6 is turned on at year 3, it captures the plumes until little remains after approximately 6 years (or about 3 years after activating Station 6).

The model output graph for the worst case scenario of MTBE concentration over time at each Station 6 well is shown in Figure 7a. As expected, MTBE concentrations peak when Station 6 is turned on, with Well 6D receiving the highest levels of MTBE (190 ppb). The MTBE levels at the other wells mimic what is happening at Well 6D but at much lower concentrations. The model results also indicate that within 3 years of the start of pumping at Station 6, the MTBE levels fall below the New York State Department of Health Maximum Contaminant Level (NYSDOH MCL) of 10 ppb. The MTBE concentrations continue to decline asymptotically for the remainder of the 20-year simulation.

### **Best Case Scenario**

The best case scenario assumes that there is some cleanup at the sources but no groundwater remediation. Based on MTBE remediation case studies, the starting concentrations at the sources were reduced by one order of magnitude, which is typical of cleanups at gas station remediation sites. Therefore, the initial conditions for this scenario are represented by the MTBE plumes shown in Figure 3, but with a new modeled starting concentration of 450 ppb at Citgo and 550 ppb at Atlas (refer to Figure 4).

Figure 6 shows the migration of MTBE over time from the sources to Station 6. As seen in the worst case scenario, Station 6 begins to capture the plumes at the start of pumping at year 3. Very little of the plumes remain after 1.5 years of pumping at Station 6.

The model output graph for the best case scenario is shown in Figure 7b. As expected, MTBE concentrations peak when Station 6 is turned on with Well 6D receiving the highest levels of MTBE (110 ppb). The model results also indicate that within 1.5 years of pumping Station 6, the MTBE levels fall below the NYSDOH MCL. This shortened time frame is due to the assumed source removal.

## **5.0 Modeling Results for Naphthalene**

Since naphthalene was not detected at Station 6, no plumes were generated using the model. The initial condition for the worst case scenario assumed the highest observed naphthalene concentration at Citgo and Atlas (820 ppb and 450 ppb, respectively). For the best case scenario, the starting naphthalene concentrations were reduced by one order of magnitude. Figure 8